International Standard

ISO 21219-21

First edition
2025-01

Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) —

Part 21: Geographic location referencing (TPEG-GLR)

Systèmes intelligents de transport — Informations sur le trafic et le tourisme via le groupe expert du protocole de transport, génération 2 (TPEG2) —

Partie 21: Information géographique (TPEG-GLR)

Reference number
ISO 21219-21:2025(en)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition cancels and replaces the first edition of ISO/TS 21219-21:2018, which has been technically revised.

The main changes are as follows:

— the document status has been changed from Technical Specification (TS) to International Standard (IS).

A list of all parts in the ISO 21219 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

0.1 History

TPEG technology was originally proposed by the European Broadcasting Union (EBU) Broadcast Management Committee, who established the B/TPEG project group in the autumn of 1997 with a brief to develop, as soon as possible, a new protocol for broadcasting traffic and travel-related information in the multimedia environment. TPEG technology, its applications and service features were designed to enable travel-related messages to be coded, decoded, filtered and understood by humans (visually and/or audibly in the user's language) and by agent systems. Originally, a byte-oriented data stream format, which can be carried on almost any digital bearer with an appropriate adaptation layer, was developed. Hierarchically structured TPEG messages from service providers to end-users were designed to transfer information from the service provider database to an end-user's equipment.

One year later, in December 1998, the B/TPEG group produced its first EBU specifications. Two documents were released. Part 2 (TPEG-SSF, which became ISO/TS 18234-2) described the syntax, semantics and framing structure which was used for all TPEG applications. Meanwhile, Part 4 (TPEG-RTM, which became ISO/TS 18234-4) described the first application for road traffic messages.

Subsequently, in March 1999, CEN/TC 278, in conjunction with ISO/TC 204, established a group comprising members of the former EBU B/TPEG and this working group continued development work. Further parts were developed to make the initial set of four parts, enabling the implementation of a consistent service. Part 3 (TPEG-SNI, ISO/TS 18234-3) described the service and network information application used by all service implementations to ensure appropriate referencing from one service source to another.

Part 1 (TPEG-INV, ISO/TS 18234-1) completed the series by describing the other parts and their relationship. It also contained the application IDs used within the other parts. Additionally, Part 5, the public transport information application (TPEG-PTI, ISO/TS 18234-5), was developed. The so-called TPEG-LOC location referencing method, which enabled both map-based TPEG-decoders and non-map-based ones to deliver either map-based location referencing or human readable text information, was issued as ISO/TS 18234-6 to be used in association with the other applications of parts of the ISO 18234 series to provide location referencing.

The ISO 18234 series has become known as TPEG Generation 1.

0.2 TPEG Generation 2

When the Traveller Information Services Association (TISA), derived from former forums, was inaugurated in December 2007, TPEG development was taken over by TISA and continued in the TPEG applications working group.

It was about this time that the (then) new Unified Modelling Language (UML) was seen as having major advantages for the development of new TPEG applications in communities who would not necessarily have the binary physical format skills required to extend the original TPEG TS work. It was also realized that the XML format for TPEG described within the ISO 24530 series (now superseded) had a greater significance than previously foreseen, especially in the content-generation segment, and that keeping two physical formats synchronized, in different standards series, would be rather difficult.

As a result, TISA set about the development of a new TPEG structure that would be UML-based. This has subsequently become known as TPEG Generation 2.

TPEG2 is embodied in the ISO 21219 series and it comprises many parts that cover introduction, rules, toolkit and application components. TPEG2 is built around UML modelling and has a core of rules that contain the modelling strategy covered in ISO 21219-2, ISO 21219-3 and ISO 21219-4 and the conversion to two current physical formats: binary (see Annex A) and XML (see Annex B); others could be added in the future. TISA uses an automated tool to convert from the agreed UML model XMI file directly into an MS Word document file that forms the annex for each physical format.

TPEG2 has a three-container conceptual structure: message management (ISO 21219-6), application (several parts) and location referencing (ISO 21219-7). This structure has flexible capability and can accommodate

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many differing use cases that have been proposed within the TTI sector and more broadly for hierarchical message content.

TPEG2 also has many location referencing options as required by the service provider community, any of which may be delivered by vectoring data included in the location referencing container.

The following classification provides a helpful grouping of the different TPEG2 parts according to their intended purpose. Note that the list below is potentially incomplete, as it is possible that new TPEG2 parts will be introduced after publication of this document.

— Toolkit parts: TPEG2-INV (ISO 21219-1), TPEG2-UML (ISO 21219-2), TPEG2-UBCR (ISO 21219-3), TPEG2-UXCR (ISO 21219-4), TPEG2-SFW (ISO 21219-5), TPEG2-MMC (ISO 21219-6), TPEG2-LRC (ISO 21219-7).

— Special applications: TPEG2-SNI (ISO 21219-9), TPEG2-CAI (ISO 21219-10), TPEG2-LTE (ISO/TS 21219-24).

— Location referencing: TPEG2-OLR (ISO/TS 21219-22), TPEG2-GLR (ISO 21219-21 – this document), TPEG2-TLR (ISO 17572-2), TPEG2-DLR (ISO 17572-3).

— Applications: TPEG2-PKI (ISO 21219-14), TPEG2-TEC (ISO 21219-15), TPEG2-FPI (ISO 21219-16), TPEG2-TFP (ISO 21219-18), TPEG2-WEA (ISO 21219-19), TPEG2-RMR (ISO/TS 21219-23), TPEG2-EMI (ISO 21219-25), TPEG2-VLI (ISO/TS 21219-26).

TPEG2 has been developed to be broadly (but not totally) backward compatible with TPEG1 to assist in transitions from earlier implementations, while not hindering the TPEG2 innovative approach and being able to support many new features, such as dealing with applications with both long-term, unchanging content and highly dynamic content, such as parking information.

This document is based on the TISA specification technical/editorial version reference:

SP22005_2.1_002

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Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) —

Part 21: Geographic location referencing (TPEG-GLR)

1 Scope

This document establishes a method of using geographic location referencing (GLR) that can be used by relevant TPEG applications. The GLR type, defined in this document, is used for defining geographic location references (points, polylines and geographical areas). The GLR method is intended to be one of the methods that can be transported inside a TPEG-Location Referencing Container (TPEG-LRC) for those TPEG applications providing information for primarily geographical locations (e.g. weather).

The GLR specification is deliberately kept basic and compact, so that it can also be employed advantageously in non-navigation devices, for simple TPEG services such as weather information, safety alerts, etc. As such, the GLR location referencing method is intended to be complementary to map-related location referencing methods, where the focus is on the referencing of anthropogenic artefacts such as roads and highways.

For this reason, the scope of GLR is limited to geographic locations on the Earth's surface.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21219-1, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 1: Introduction, numbering and versions (TPEG2-INV)*

ISO 21219-9, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 9: Service and network information (TPEG2-SNI)*

ISO 21219-14, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 14: Parking information (TPEG2-PKI)*

ISO 21219-16, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 16: Fuel price information and availability (TPEG2-FPI)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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3.1
point of interest
specific point location that someone may find useful or interesting

EXAMPLE 1 A point on the Earth representing the location of the Eiffel Tower, in Paris, France.

EXAMPLE 2 The location of a weather station on top of Mount Washington in New Hampshire, VT, USA.

EXAMPLE 3 The location of a fuel station.

4 Abbreviated terms

For the purposes of this document, the abbreviated terms in ISO 21219-1, ISO 21219-9, ISO 21219-14, ISO 21219-16 shall apply.

5 Toolkit specific constraints

5.1 Version number signalling

Version numbering is used to track the separate versions of an application through its development and deployment. The differences between these versions could have an impact on client devices.

The version numbering principle is defined in ISO 21219-1.

Table 1 shows the current version numbers for signalling GLR versions within the SNI application.

Table 1 — Current version numbers for signalling of GLR

Major version number	2
Minor version number	1

5.2 Extendibility

Future toolkit extensions may insert new components or may replace existing components by new ones without losing backward compatibility. This means that a TPEG2-GLR decoder shall be able to detect and skip unknown components.

6 GLR toolkit structure

6.1 General

The GLR toolkit provides a component for simple geographic location references. This component can be inserted in an LRC inside a TPEG message, when this type of location reference is relevant and suitable for the particular TPEG application.

Figure 1 shows the structure of GeographicLocationReference in the GLR toolkit. Other classes used in the toolkit are shown in Figure 2, Figure 3, Figure 4 and Figure 5. The GLR location reference offers several variants of geographic location references. However, each instance shall contain only a single type of the provided various types of geographic location references.

The binary format and XML format of the TPEG2-SNI application for use in transmission shall be in accordance with Annexes A and B, respectively.

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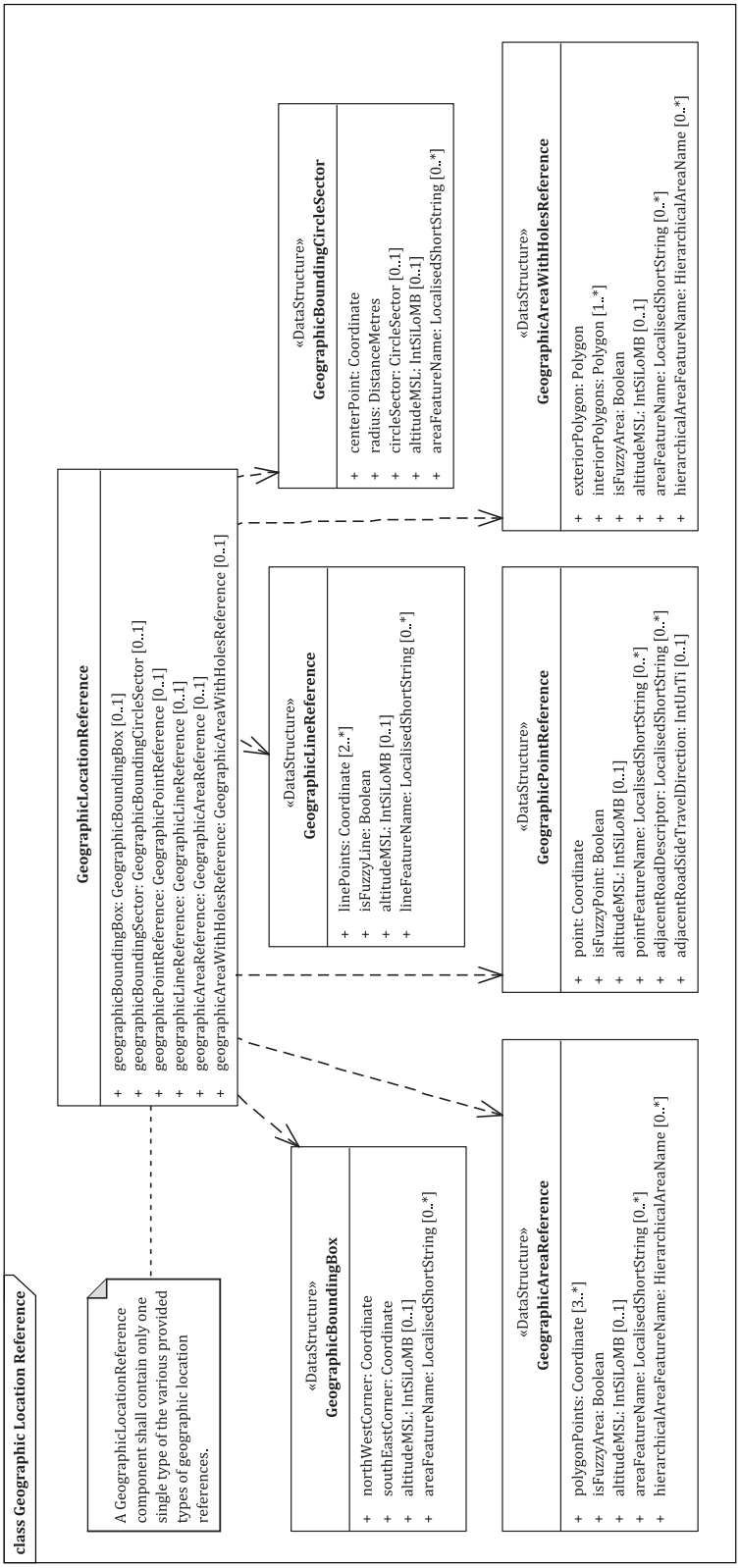

Figure 1 — GLR toolkit structure

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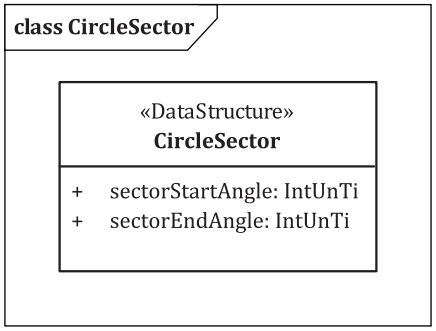

Figure 2 — CircleSector

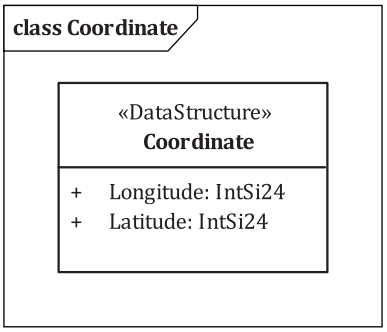

Figure 3 — Coordinate

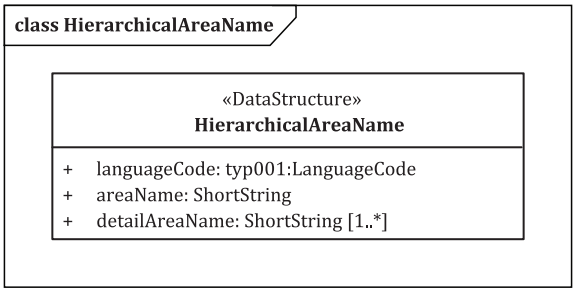

Figure 4 — HierarchicalAreaName

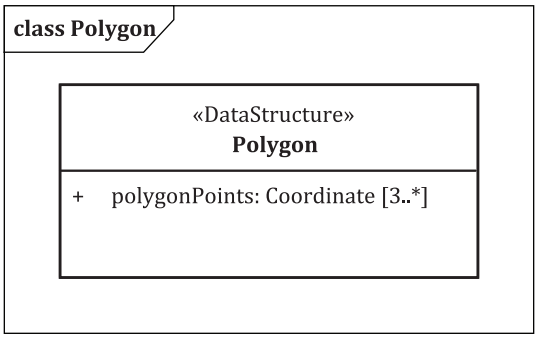

Figure 5 — Polygon

In a GLR location reference, coordinates are specified in the WGS84 geodetic system, unless explicitly signalled otherwise at service level or service component level (see also 8.8).

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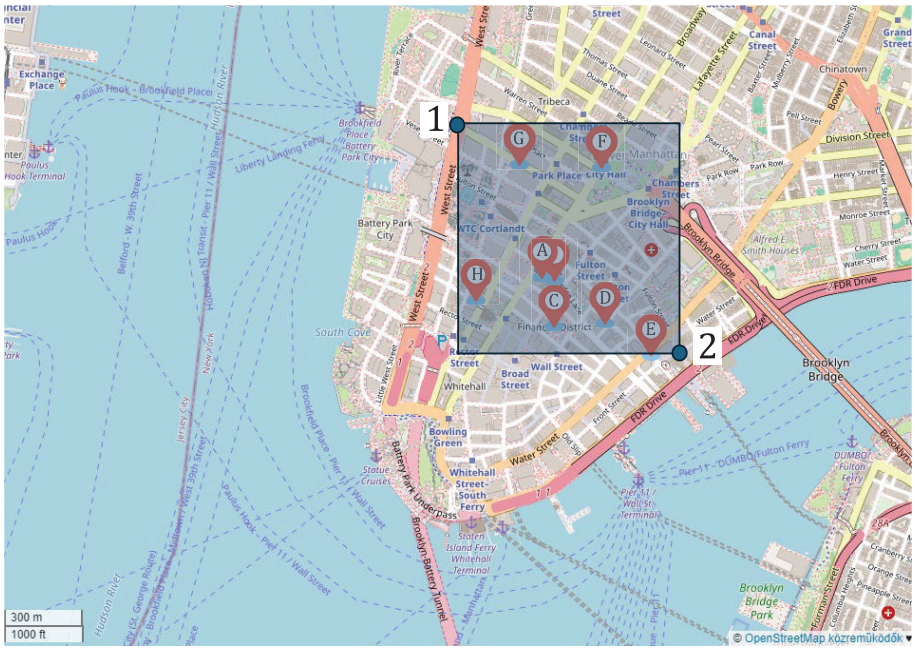
The GLR toolkit contains two versions of bounding areas, and point, line and area location references. Subclauses 6.2 – 6.6 explain each of these variants of geographic location references in more detail.

6.2 Geographic bounding box location reference

A geographic bounding box location reference defines a rectangular area to indicate, for example, a search area or encompassing area of a collection of features, e.g. fuel stations or other points of interest (POIs). Figure 6 shows a bounding box, with its defining north-west (NW) and south-east (SE) corners. For example, this bounding box location reference delineates the locations of a collection of fuel stations in Manhattan, NY, USA.



Key

1 NW corner

2 SE corner

Figure 6 — Example of a geographic bounding box indicating a delineating search area for a set of fuel stations

Geographic bounding box location references may indicate the altitude above mean sea level (MSL) of the area, and may have an area name as descriptor.

6.3 Geographic bounding circle or sector of circle location reference

A geographic bounding circle location reference is very similar in nature to the geographic bounding box location reference. The main difference is the definition of the encompassing area: in this case it is a circle rather than a rectangle. This circle is defined by a centre point and a radius (see Figure 7).

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